FAST™

smart financial modelling

Standards Comparison

BPM

STANDARDS COMPARISON

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BEST PRACTICE MODELLING (BPM)

Best Practice Modelling (BPM) is a business modeling organization that specialises in the provision of best practice spreadsheet modeling resources including software, consulting and training services. BPM is the founding member of the Spreadsheet Standards Review Board (SSRB) and remains committed to overseeing the ongoing maintenance, development and adoption of the Best Practice Spreadsheet Modeling Standards. BPM can be contacted as follows:

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Chapter 1

Introduction

1.1 What are Spreadsheet Standards?

As spreadsheet modeling activities within organizations grow and become more complex, the need for spreadsheet modeling standards and accountability behind decision-making processes also grows.

This document has been created by BPM Financial Modelling ('BPM') to compare three sets of well-known, freely-available spreadsheet modeling standards. They are:

- Best Practice Spreadsheet Modelling Standards (the 'Standards'), as developed and maintained by the Spreadsheet Standards Review Board ('SSRB'), which is managed by BPM;
- FAST Modeling Standard ('FAST'), as developed and maintained by FAST.
- SMART Financial Modelling ('SMART'), as developed and maintained by Navigator Project Finance and Corality; and

References:

BPMS – Best Practice Modelling Standard referenced specifically.

BPMC – Best Practice Modelling Convention (the 'Conventions') referenced specifically.

SMART – SMART methodology is split into three chapters, so the first standard of the first chapter will be referenced here as 1.01 and so on.

FAST – referenced specifically.

1.2 Document Purpose

This document has been created as part of a number of internal processes aimed at:

- comparing the three sets of spreadsheet modeling standards;
- ensuring the Standards are up-to-date with the latest thinking and developments in spreadsheet modeling; and
- reviewing the alternative approaches for reasonableness.

BPM believes this regular process is required in order to maintain our position that the Standards are the most definitive and comprehensive set of spreadsheet standards available.

1.3 Best Practice Spreadsheet Modelling Standards

The Standards, developed in 2002 and maintained by the SSRB and BPM, aim to provide the model development and business communities with:

- freely-available, universally-applicable and definitive principles against which the quality of spreadsheet models can be assessed; and
- a platform for the standardisation of spreadsheet model development processes.

The Standards explain **how** to develop best practice spreadsheet models, not **what** to include in spreadsheet models. With few exceptions, all Standards are universally applicable methodologies or approaches to spreadsheet development, maintenance and use; they do not cover methodologies or approaches relating to specific spreadsheet content.

The following definitions govern the categorisation of the Standards and Conventions:

Best Practice Modelling Standard (BPMS):

- A methodology or approach that is **required** to implement best practice spreadsheet modelling.

Best Practice Modelling Convention (BPMS):

- A methodology or approach that is **recommended** to implement best practice spreadsheet modelling.

The current version of the Standards is version 7.0 and can be found in the link below.

www.ssrb.org/files/resources/resources.htm

1.4 FAST Modeling Standard

The FAST[1] Modeling Standard ('FAST') is owned by the FAST Standards Organisation Limited, a not-for-profit body. It is maintained and developed by the Moderation Board, made up of modeling professionals from Deloitte, Grant Thornton, Mazars, Rebels, F1F9 and Financial Mechanics.

The FAST set of rules seeks to provide both a clear route to good model design for the individual modeler, and a common style platform on which modelers and reviewers can rely when passing models amongst themselves.

The general principle is that financial models must be "as simple as possible, but no simpler".

The current version is FAST01b, as at 16th November 2011, and can be found in the link below.

www.fast-standard.org/the-standard/

1.5 SMART

SMART is Navigator Project Finance's[2] best practice financial modeling methodology, developed to meet the need of decision-makers and financiers across all major project finance industries. It seeks to decrease model risk and increase the confidence of all users.

SMART is practical rather than theoretical, and aims to accommodate the needs of a wide range of users – from model developers, managers, debt financiers, equity investors and model auditors to the CFO.

[1] Acronym for Flexible, Accurate, Structured and Transparent.
[2] Navigator Project Finance merged with Corality in July 2011 to form Corality Financial Group.

SMART does not appear to use version numbers. The document reviewed is current as at May 2014 and can be found in the link below.

www.navigatorpf.com/sites/all/themes/navigator/downloads/SMART-User-Manual.pdf

Chapter 2

Comparable Elements

2.1 Overview

The following chapter contains a complete listing and description of the Standards and Conventions.

Each Standard and Convention is compared to FAST and SMART to illustrate where the latter omit a narrative or stance on an area of spreadsheet standardization. This also helps us to understand where the Standards might be arbitrary or overtly prescriptive in content, i.e. whether a Standard or Convention should be retained or might be deemed superfluous.

2.2 Matching Standards

BPMS	BPM Standard Title	FAST	FAST Equivalent	SMART	SMART Equivalent
1-1	Workbook Purpose	2.06-02	Provide a list of model qualifications and weaknesses.		
The purpose of a workbook should be the primary consideration of a model developer during every stage of a workbook's development.					
1-2	Sheet Classification			1.02	Use separate worksheets for Inputs, Calculations and Outputs.
The sheet content and sheet purpose of every sheet in a workbook should be visually identifiable at all times.					
1-3	Sheet Content			1.02	Use separate worksheets for Inputs, Calculations and Outputs.
Every sheet in a workbook should be visually identifiable as being one of the following sheet types: See Standards 7.0 for further details.					
1-4	Sheet Purpose	1.01-01	Separate worksheets by type.	1.02	Use separate worksheets for Inputs, Calculations and Outputs.
Every sheet in a workbook should have the purpose of either collecting assumptions or not collecting assumptions.					
1-5	Cell Classification	1.06-06	Mark inter-sheet exports and imports with red and blue font.	3.04	Develop customised style guides.
The cell content and cell purpose of every cell in every worksheet should be visually identifiable at all times.					
1-6	Cell Content			3.02	Visually identify inputs
Every cell in every worksheet should be visually identifiable as containing one of the following content types: Constant; Formula; or Mixed (combination of constant and formula).					
1-7	Cell Purpose			3.02	Visually identify inputs.

BPMS	BPM Standard Title	FAST	FAST Equivalent	SMART	SMART Equivalent
Every cell in every worksheet should be visually identifiable as having one of the following cell purposes: Assumption cell; or Output cell.					
1-8	Assumption Classification			2.07	Use clearly identified flex cells to run sensitivities.
Every assumption in a workbook must be classified as one of the following types: Base assumption; or Sensitivity assumption.					
1-9	Assumption Cell Content				
Every assumption cell in every worksheet should contain constant cell content.					
2-1	Workbook Cover Sheet				
Every workbook that contains more than one sheet should contain a separate cover sheet as the first sheet in the workbook.					
2-2	Workbook Sections	1.02-04	Separate workings sheets into functional 'chapters'.		
A separate section should be created in a workbook for each sheet or group of sheets containing similar types of information.					
2-3	Section Cover Sheets	1.02-04	Separate workings sheets into functional 'chapters'.		
A section cover sheet should be used at the start of each section in a workbook to indicate the commencement of each new section.					
2-4	Table of Contents	2.06-01	Provide a table of content.		
A section cover sheet should be used at the start of each section in a workbook to indicate the commencement of each new section.					
2-5	Table of Contents Information	2.06-01	Provide a table of content.		

BPMS	BPM Standard Title	FAST	FAST Equivalent	SMART	SMART Equivalent
A Table of Contents should: show the sections of the workbook; reference the sheet title of each sheet in the model; clearly number each section and sheet; and be located near the front of the workbook.					
2-6	Workbook Navigation				
Every workbook with more than one sheet should contain: a table of contents sheet outlining the sections and sheets in the workbook; hyperlinks from the table of contents to every sheet in the workbook; and a hyperlink to the table of contents always in view on every sheet in the workbook.					
3-1	Sheet Titles				
Every sheet in a workbook should contain a clearly highlighted sheet title that is: consistently formatted on every sheet; consistently located on every sheet type; and always in view on the screen when that sheet is active.					
3-2	Sheet Type Consistency			3.05	Worksheets should be labelled, grouped, color-coded and ordered.
Sheets of the same sheet type within a workbook should be consistently structured and formatted.					
3-3	Grouping Rows or Columns	2.01-08	Do not hide anything.		
When hiding rows or columns in a worksheet, the rows or columns should always be grouped, not hidden.					
4-1	Formats and Styles Key	2.05-03	Provide a description of the modelling standards and methods.		
Every workbook should contain a key or legend that explains the purpose of each format and style that has been applied to the cells in the workbook.		2.05-05	Provide keys to colour coding, abbreviation, Named ranges, and functions.		
4-2	Worksheet Data Alignment				

BPMS	BPM Standard Title	FAST	FAST Equivalent	SMART	SMART Equivalent
All data of the same type on a worksheet should be consistently aligned down rows or across columns.					
4-3	Denomination Identification	3.01-08	Make numbers look like what they are with smart format.		
Every number in a workbook should clearly indicate what type of denomination it is by either: stating the denomination of a number in an appropriate corresponding heading, title column, row or label; or formatting the number such that it is displayed as its denominator (e.g. $20, 20 tonnes, 20% or 20.0x).					
4-4	Workbook Denomination	3.05-09	Include units in the label.	3.03	State dimensions and labels concisely.
Where denominations differ from the primary denomination, they should be clearly labelled to inform other model developers and model users.		2.03-06	Include definition of SMU on Presentation sheets.		
4-5	Hyperlink Consistency				
All hyperlinks within a workbook should use a consistent, dedicated style or format so that they are visually identifiable as being hyperlinks.					
4-6	Work in Progress	3.02-02	Mark temporary code clearly.		
Any cell within a workbook that is subject to further work or not finalised should be visually identifiable as being work in progress.					
5-1	Assumptions Location	1.02-01	Use separate input and result sheets.	2.02	No hard coding.
All assumptions contained in a workbook should be located on dedicated and visually identifiable assumptions sheets.					
5-2	No Assumption Repetition				
Any single assumption should never be entered more than once into a workbook.					
5-3	Control Cell Link Placement				

BPMS	BPM Standard Title	FAST	FAST Equivalent	SMART	SMART Equivalent
Every cell link that is attached to a control in a workbook should be located in the top left cell of the range over which its control is placed.					
5-4	Control Lookup Data				
When using a control in a workbook that requires an input range, the lookup data should always be located on a separate lookups sheet.					
5-5	In-Cell Drop Down Lists				
A cell in which data validation is used to create in cell drop down lists the range in which the drop down list is inserted should always be formatted as an assumption cell.					
6-1	Separate Sensitivity Assumption Sheets				
Every workbook that contains sensitivity analysis functionality should contain a dedicated sensitivity assumptions section (which is separate to the base assumptions section).					
6-2	Sheet Type for Sensitivity Assumptions Entry Interfaces				
All sensitivity assumptions in a workbook should be located on assumptions sheets.					
6-3	Separate Sensitivity Assumptions Entry Interfaces				
Sensitivity assumptions should always be located on a dedicated sensitivity assumptions sheet which is separate to its corresponding base assumptions sheet.					
7-1	Segregation of Outputs			1.02	Use separate worksheets for Inputs,

BPMS	BPM Standard Title	FAST	FAST Equivalent	SMART	SMART Equivalent
Outputs sheets and presentations, which may take the form of tables, graphs, diagrams or pictures, amongst other forms, should always be located in either: a separate, clearly labelled section of a workbook; or a separate dedicated outputs workbook.					Calculations and Outputs.
7-2	Presentation Sheets	2.05-01	Use presentation sheets to present model results.	3.12	Summarise output using plots (charts and graphs).
A presentation sheet is a sheet that is included in a workbook in order to present outputs which are necessarily exempt from the standards and conventions in order to meet aesthetic or corporate requirements.					
7-3	Presentation Sheet Usage				
Presentation sheets should only be included in a workbook where it is not possible to use non-presentation sheets to achieve the same objective.					
8-1	Consistent Formulas	3.02-01	Formulas must be consistent.	2.04	Consistent formula per row.
When more than one adjacent cell contains a similar type of output the structure and components of the formulas within the cells should always be consistent, so that the cell can be copied across / down the relevant range without needing to make changes.		2.01-03	Make only two columns matter.		
8-2	No Assumptions in Mixed Cell Content	3.04-01	Do not write formulas with embedded constants.	2.02	No hard coding
Assumptions should not be embedded in cells containing mixed cell content – i.e. cells containing content with a combination of constant and formula.					
8-3	Circular References	1.01-11	Never release a model with purposeful use of circularity.	1.08	No circular references.
A workbook or group of linked workbooks should never contain a circular reference.					
9-1	Workbook Naming			3.05	Worksheets should be labelled,

BPMS	BPM Standard Title	FAST	FAST Equivalent	SMART	SMART Equivalent
Each workbook should be named such that the name: allows for different versions of the workbook; remains consistent between versions of the workbook; and differentiates the workbook from other workbooks.					grouped, colour-coded and ordered.
9-2	Sheet Naming				
Every sheet name in a workbook should indicate the sheet type.					
9-3	Range Naming				
Every range name in a workbook should describe the content or use of the range being named.					
9-4	Standardised Naming Prefixes				
Every range name in a workbook should have a standardised prefix to identify what type of range the name refers to or the purpose of that range.					
10-1	Time Series Assumptions				
Every workbook that undertakes time series analysis should clearly state, for each distinct time series: the time series start date; and the time series periodicity.					
10-2	Time Series Period Labels	1.01-03	Maintain a constant time ruler throughout the model.		
A time series should always contain a consistent set of periodicity labels and counters that are located in the same position on every relevant worksheet in the workbook.					
10-3	Time Series Period End Dates	2.03-02	Display a single end-of-period date in a freeze pane.		
The period end date label for each period in a time series sheet should always be in view on the screen.					
10-4	Time Series Periodicity Identification				

BPMS	BPM Standard Title	FAST	FAST Equivalent	SMART	SMART Equivalent
The periodicity of each time series sheet should be clearly identified and always in view on each time series sheet.					
10-5	Time Series Number of Periods				
A workbook that undertakes time series analysis should always include a cell or cell range that indicates the number of periods in each distinct time series.					
10-6	Time Series Sheet Consistency	1.01-02	Maintain consistent column structure across all sheets.		
Time series sheets for each distinct time series within a workbook should always: contain the same number of periods; and have the first period starting in the same column (or more rarely, row).		1.01-03	Maintain a consistent time ruler throughout the model		
11-1	Checks Classification				
All checks in a workbook should be classified as being one of the following check types: Error check; Sensitivity check; or Alert check.					
11-2	Error Checks	2.03-05	Include master error and alert indicators in the freeze pane.	3.06	Include integrity checks.
Every workbook should contain appropriate error checks to assist in identifying errors in the workbook.					
11-3	Sensitivity Checks			3.06	Include integrity checks.
Every workbook that contains one or more sensitivity assumptions should contain sensitivity checks to identify when there is an operative sensitivity assumption.					
11-4	Alert Checks	2.03-05	Include master error and alert indicators in the freeze pane.	3.06	Include integrity checks.
Every workbook that requires checks that are not classified as error checks or sensitivity checks should contain alert checks to identify when such a check has been triggered.					

BPMS	BPM Standard Title	FAST	FAST Equivalent	SMART	SMART Equivalent
11-5	Error Checks Summary			3.06	Collate checks into one central area.
The outcome of every error check in a workbook should be displayed in a dedicated and separate error checks summary.					
11-6	Sensitivity Checks Summary			3.06	Collate checks into one central area.
The outcome of every sensitivity check in a workbook should be displayed in a dedicated and separate sensitivity checks summary.					
11-7	Alert Checks Summary			3.06	Collate checks into one central area.
The outcome of every alert check in a workbook should be displayed in a dedicated and separate alert checks summary.					
11-8	Check Indicator Flag	2.03-05	Include master error and alert indicators in the freeze pane.		
A message or indicator that clearly notifies the model developer or user that a check has been triggered in a workbook should always be in view on every worksheet in a workbook.					
11-9	Check Cell Formatting				
Each check cell in a workbook should be formatted in such a way that it will visually indicate when an error, sensitivity or alert check has been triggered.					
11-10	Dedicated Checks Summaries				
A workbook should not contain more than one of each of the following types of check summaries: Error checks summary; Sensitivity checks summary; and/or Alert checks summary.					
12-1	Table of Contents Page Numbers				

BPMS	BPM Standard Title	FAST	FAST Equivalent	SMART	SMART Equivalent
Every workbook with more than one sheet should contain a table of contents that displays the corresponding printed page numbers for each sheet. As such a workbook should always print with a Table of Contents that is consistent with any page numbers printed on the individual sheet pages.					
12-2	Sheet Page Numbers				
Every sheet within a workbook should contain page numbers that correspond with the printed page numbers stated in the workbook table of contents, when printing the entire workbook.					
12-3	Page Margin Consistency				
The page margins on every sheet in a workbook should be consistent.					
12-4	Print View Consistency				
The print scaling setting and hence the size of the content on each printed page in a workbook should, where practical, be consistent for each sheet.					
12-5	Page View Consistency				
The view type should be the same for each sheet in a workbook.					
12-6	Worksheet View Consistency				
Prior to providing a workbook to a model user, the view of every worksheet in the workbook should be set such that the top-left corner of the worksheet is in view (i.e. cell A1 is selected).					
13-1	External Workbook Imports	1.03-02	Avoid direct (external file) links.		
All links from an external workbook into a workbook should be made via dedicated and separate import sheets.		1.03-03	Use import / export sheets.		

BPMS	BPM Standard Title	FAST	FAST Equivalent	SMART	SMART Equivalent
13-2	External Workbook Exports	1.03-02	Avoid direct (external file) links.		
All links to an external workbook from a workbook should be made via dedicated and separate export sheets.		1.03-03	Use import / export sheets.		
13-3	Workbook Outputs Links				
All formulas on an export worksheet should always be linked directly to the workbook calculations.					
16-1	Automatic Calculation Setting				
A workbook should, where practical, be set to calculate automatically.					

2.3 Convention Listing Comparison

BPMC	BPM Convention Title	FAST	FAST Equivalent	SMART	SMART Equivalent
3-1	Sheet Content Consistency	1.01-02	Maintain consistent column structure across all sheets.		
It is recommended that every sheet of the same sheet type in a workbook consistently apply the following properties: Sheet title style and position; Heading styles and spacing; Purpose-based formats and styles; Hyperlink positions and styles; Zoom/scaling percentage of the visible and printed sheets; Visibility of gridlines; Grouping levels; and Window panes/splits.					
3-9	Freezing Panes	2.01-02	Time series should be located within freeze pane.	3.09	Make good use of screen with freeze panes.
It is recommended that frozen panes be used on every worksheet in a workbook (excluding cover sheets) to ensure that the sheet title, any hyperlinks, error flags or date and time titles are always in view.		2.03-02	Display a single end-of-period date in a freeze pane.		
		2.03-05	Include master error checks and alert indicators in the freeze pane.		

BPMC	BPM Convention Title	FAST	FAST Equivalent	SMART	SMART Equivalent
3-10	Grouping Levels			3.08	Use data grouping and a clear heading hierarchy.
It is recommended that rows and columns within the worksheets in a workbook be grouped consistently across all worksheets to create the following three views: Summary view (compacted); Print view (semi-compacted, if required); and Expanded view (un-compacted).					
4-1	Use of Purpose-Based Styles	4.02-01	Use well defined format styles.		
It is recommended that standardised, purpose based styles be applied in order to adopt the most efficient method of applying different combinations of formats and consistently identify and differentiate cell purpose and cell content.					
5-11	Conditional Formatting of Assumption Cells			2.05	Build in dynamic timing.
It is recommended that conditional formatting be used to indicate to model users which assumption cells are inactive at any point in time – i.e. not relevant to outputs calculations.					
8-1	Avoid Complex Formulas	3.03	Formula simplicity.	1.03	Use concise, simple formula.
It is recommended, where practical, that complex formulas not be used within a workbook.					
8-3	Multiple Function Formulas	3.04-02	Include spaces between arguments in formulas.	1.04	Minimise embedded logic
It is recommended that formulas within a workbook that contain more than one function be separated within the formula such that each new function is displayed on a separate line of the formula bar.					
10-3	Multiple Periodicities in One Workbook	1.01-03.01	Consistent time rule throughout model, but exception when multiple time resolutions are required.		
It is recommended that no section in a time series workbook contains more than one periodicity.					

BPMC	BPM Convention Title	FAST	FAST Equivalent	SMART	SMART Equivalent
15-1	Recording Macros			1.08	Do not overuse macros.
It is recommended that only extremely simple macros be created using the macro recorder. Macros created using the macro recorder should not be relied upon by model developers who are not familiar with the resulting source code. *Macros should only be written by experienced VBE programmers.*					

Chapter 3

Standards Variations

The following chapter looks at items in SMART and FAST that have been omitted by the SSRB / BPM Standards and Conventions.

The purpose of this is to understand where the Standards or Conventions might be lacking or missing content or an approach that the wider community considers reasonable.

The Standards and Conventions are designed to assist with 'how' to model, rather than 'what' to model. Therefore, in many instances a FAST or SMART Standard has been omitted on these grounds as content-specific.

In addition to the above point, one of the key principles determining the inclusion, or more typically, exclusion of a Standard is whether it can be adhered to on a systemic basis. For example, the segregation of assumptions and outputs (BPMS 1-4) can be done systematically, with no grey area. There are two reasons for this approach:

- the Standards and Conventions can be integrated with a system (bpmToolbox) that implements them definitively; and
- the potential for arbitrary or vague standards is substantially reduced.

3.1 FAST Modeling Standard

Standard	Description	Commentary
1.01-04	Ensure primary time rulers span time frames of secondary rulers.	The Standards state no parallel assumptions, which would cover any model start date assumption, implying the same start is applied to 'primary' and 'secondary' rulers. Duration of the model then relates to content.
1.01-05	Proliferate links to maximize navigation efficiency.	Relates to content. Less efficient than the more orderly inclusion of hyperlinks, a centralised table of contents and the use of bpmTraverse for navigation.
1.01-06	Mark exports with red font and imports with blue font.	In this context FAST refer to 'imports' as information from another worksheet and 'exports' as information going to another worksheet (not the BPM reference to imports and exports for inter-work data transfers). BPM agrees with the core concept of purpose-based formatting. However, if a single piece of data is to be used on the same worksheet and on another worksheet this standard would suggest it needs two colours, calculation colour and red export colour. One alternative might be to simply restate a piece of data (in red) to indicate that that piece of data is being used on another worksheet. However, this would then be at odds with FAST 3.06-02 (don't create daisy chains).

Standard	Description	Commentary
1.01-07	Calculate only once.	This is not always practical and also at odds with the standard that advocates the re-calculation of totals (FAST 3.01-04) and a further inconsistency with the above.
1.01-08	Use normally positive convention on Workings sheets.	Many reporting conventions have positives for both revenues and expenses on the income statement whilst presenting the cash flow statement as positives for inflows and negative for outflows. Trial balance data often comes in the form of positive values for debits and negative values for credits. As such it is not possible to follow this standard systematically.
1.01-09	Use in-flow / out-flow convention on Presentation sheets.	See above. Furthermore a presentation sheet analysing nothing but capital expenditure might make more sense presented entirely as positives (for charting and legibility) rather than entirely as negatives.
1.02-01	Arrange sheets so that calculation order flows left to right.	Summary sheets are often placed near the beginning (left) of a model, therefore this is not always suitable.
1.02-02	Do not attempt to optimize calculation layout and user interface / presentation on the same worksheet.	Relates to content.
1.02-03	Separate flags and factors onto dedicated sheets.	Relates to content.
1.02-05	Minimize inter-linking between sheets.	It is often more practical to have separate module area calculations located on dedicated worksheets. "Minimize" is also somewhat arbitrary and as such it is not possible to follow this standard systematically.
1.03-01	Do no split a model across multiple workbooks.	This FAST principle has a range of obvious caveats, so we're unsure why it has been included in the first place.
1.03-04	External file links should be named.	Use of dedicated import / export worksheets would eliminate the risk of cell location changes. This also goes against FAST 4.03-01 (do not use Excel names).
2.01-01	Each column should have a single and consistent purpose.	This is reasonable in the case of time series analysis and having period 1 in the same column on every worksheet. However, further prescription beyond time periods relates to content.

Standard	Description	Commentary
2.01-04	Calculation logic should generally flow from top to bottom and left to right.	This standard relates to content. It doesn't allow the user to place a summary of a worksheet's contents at the top of the worksheet, nor lay information out in terms of priority. The use of the term 'generally' also undermines the use of the standard for systematic guidance. For example: FAST 2.02-03 suggests placing 'factors' last in a section, which is at odds with this standard.
2.01-05	Mark intra-sheet counter-flows with grey shade.	This is required to the extent that standards are included that relate to calculation directions such as 2.01-04 (above).
2.01-06	Limit counter-flows to opening balance positions.	This doesn't allow the user to place a summary of a worksheet's contents at the top.
2.01-07	Present information horizontally.	Relates to content.
2.02-01	Construct all calculations in a separate calculation block.	It is not always practical to have all information for a calculation located proximally. With the advent of spreadsheet navigation software this approach is out-dated. This standard also at odds with other Standards that recommend dedicated lookup-sheets and similarly beneficial structures. The approach is also inconsistent with other FAST standards that advocate no daisy chains (FAST 3.06-02).
2.02-02	Build calculation blocks so they can be replicated.	Relates to content.
2.02-03	List common calculation block components in a consistent order.	Relates to content.
2.02-04	List precedents in the order they appear in a formula.	This standard would require the user to constantly rearrange worksheet layouts to reflect calculation changes. The time cost of doing this would likely outweigh the benefits of doing so. This is also likely to conflict with the advice of other standards, such as FAST 2.02-03 (list calculation block components in a consistent order).
2.02-05	Use corkscrew calculation blocks for balance accumulation.	Relates to content.
2.02-06	Use timing flag and factor components routinely.	Relates to content.
2.03-03	Displace the operative period flag.	Relates to content.
2.03-04	Include a column counter for cross-reference on F11 quick charts.	Relates to content.
2.04-01	Organise inputs both by structure and content.	Relates to content.

Standard	Description	Commentary
2.04-02	Include a dedicated instruction / comments column on input sheets.	This is a sensible suggestion. However the logical layout of model assumptions and appropriate headings should be sufficient for communicating with the end user. Likewise, Excel comments are more suitable for end users to store information about assumptions (a comment column is inefficient for storing comments about a row of time-based assumptions).
2.04-03	Create self-documenting input sheet.	We are unsure what guidance this is providing the user. It might be that all assumptions should be included in the print range of the worksheet – which might therefore include confidential data. Alternatively, it might be that the layout of the model should be such that the assumptions print nicely. In either instance the issue relates back to content.
2.05-04	Provide a description of the model's flow.	Relates to content.
2.05-06	Selection of chart type should correspond to the nature of the data being presented.	Relates to content.
2.05-07	Charts should be formatted for ease of comprehension of the main messages being communicated.	Relates to content.
3.01-02	Treat line items as the smallest indivisible object in a model.	Relates to content.
3.01-03	Do not use a series structure of present constants.	Relates to content.
3.01-04	Do not use row totals in model logic.	Relates to content. This is also at odds with calculating things only once (FAST 1.01-07).
3.01-05	Include display totals on all flows.	This relates primarily to content. This standard also undermines the concept of not having more than one time period on a single worksheet (FAST 2.01-02).
3.02-03	Do not use partial range references.	Relates to content.
3.03-01	Do not write a formula longer than your thumb.	This is arbitrary.
3.03-02	No formula should take more than 24 seconds to explain.	This is arbitrary.
3.03-03	Do no write multi-line formulas.	Carriage-returns enable the model developer to 'parse' formulas to make them easier to understand. Does not take monitor size into account.
3.03-04	Use a limited set of Excel functions.	This is arbitrary.

Standard	Description	Commentary
3.03-05	Use flags to limit use of IF functions.	It is not clear why this would be universally appropriate advice given the calculation time benefit of IF-statements short-circuiting 'heavy' inactive calculations.
3.03-06	Use INDEX (or even CHOOSE) over IF to pick values.	It is not clear why this would be universally appropriate advice given the calculation time benefit of IF-statements short-circuiting 'heavy' inactive calculations.
3.03-07	Never use nested Ifs.	Relates to content.
3.03-08	Do not use Excel names.	It is not clear why this would be universally appropriate advice.
3.03-09	Do not construct array formulas.	Relates to content.
3.03-10	Do not use a space as an intersection operator.	Relates to content.
3.03-11	Beware circularity or #ERRORs protected on an inactive branch of IF function.	Good advice but arbitrary given the wide range of issues to beware of.
3.04-03	Do not use parenthesis in formulas unnecessarily.	Good advice but arbitrary given the wide range of inefficiencies that could be included as standards, such as 'Do not multiply figures by 1'.
3.04-04	Use "-1*" coefficient for all sign switches.	It is not clear that this would make the switching of signs clearer or increase the apparent complexity of calculations.
3.04-05	Do not include current sheet references in formulas.	There are benefits to including the sheet reference in certain formulas. Relates to content.
3.04-06	Do not use elements that appear to be non-structural in model logic.	Relates to content.
3.04-07	Do not over-anchor.	This is comparable to FAST 3.04-03 with regards to good but overly prescriptive advice. This standard is also somewhat at odds with FAST 2.02-02 and building blocks that can be replicated. Sometimes anchoring would be required to enable future copying but arguably represents over-anchoring in the first instance.
3.05	FAST Labelling Conventions.	Good advice but overly-prescriptive and relates to content.
3.06-01	Row anchor all links.	This is internally inconsistent with FAST 3.04-07 and therefore no clear guidance is being provided.
3.06-02	Do not create daisy chains; do not link to links.	This is internally inconsistent with other standards that recommend presenting all the information used by a calculation next to it (FAST 2.02-01).
3.07	Timing Flags and PPF's.	FAST position being developed.
4.01-01	Use the INDEX function over the CHOOSE function.	Relates to content.
4.01-02	Do not use the NPV function – ever.	Relates to content.

Standard	Description	Commentary
4.01-03	Do no use OFFSET and INDIRECT functions.	Relates to content.
4.01-04	[Don't] Round.	Relates to content.
4.02-02	Do not merge cells.	Merged cells can be important for aesthetic and formatting purposes, for example to maintain consistent column widths and row heights across worksheets.
4.03	Excel Names.	BPM Standards do not require the use of range names but do recommend their use.

3.2 SMART

Standard	Description	Commentary
1.05	Minimise the use of named ranges.	BPM Standards do not require the use of range names but do recommend their use.
1.06	Use control accounts.	Relates to content.
1.07	Consistently add cells.	This relates to signage presentation which might not always be possible between presenting a capital expenditure summary as positive numbers (often a preference) and using trial balance import information which have specific debit/credit signage settings.
2.03	Control scenarios with a dedicated manager.	BPM Standards require sensitivity assumptions to be located on separate assumption sheets.
2.06	Build in spare lines.	Relates to content.
3.05	Worksheets labelled, grouped, colour-coded and ordered.	As several BPM Standards and Conventions already help the user to identify the content and purpose of a worksheet, there is no requirement to colour-code worksheet tabs. The table of contents and use of section worksheets also satisfies these requirements.
3.07	Use conditional formatting.	BPM Standards only recommend conditional formatting to flag inactive assumption cells at any point in time (which will not feed through to calculations), which is a generally applicable standard. SMART 3.07 recommends it to differentiate between different project phases, which relates to specific content.
3.10	Use line summaries.	Relates to content.
3.11	Summarise output using plots.	Relates to content.

Chapter 4

Summary

A number of the standards and principles put forward by FAST and SMART are beneficial and would improve the consistency and quality of models if implemented. However, these standards either relate to specific content or take a somewhat arbitrary stance on issues.

In a number of instances the standards are caught between either being too prescriptive or too broad. Adherence to the more prescriptive standards leads to modeling becoming internally inconsistent. By comparison, those that are too broad then lack value in providing guidance on the most suitable approach for a model developer to take.

4.1 Implementation

As with any process aimed at preventative action or forward-looking safety, there are barriers to adherence and routine implementation. Following any set of modeling standards has a time-cost associated, with everything from simple formatting to more comprehensive model structures, such as table of contents and integrated checks.

The overarching rationale behind each of the Best Practice Spreadsheet Modelling Standards is that they can be implemented systematically. As a result of this fundamental rationale, they can therefore also be driven programmatically. This principle was behind the development of bpmToolbox, a Microsoft add-in which enables users to construct models in line with the Standards, quickly and efficiently. bpmToolbox removes all of the time-costs associated with adherence to the Best Practice Spreadsheet Modelling Standards[3].

SMART and FAST contain valid approaches but both lack a truly system-based approach and more importantly, a solution to the time-cost of implementation issue. In the absence of providing such a solution, both approaches constitute at best good advice.

At worst, on-going adherence to either may actually increase the cognitive pressures on a model developer, rather than reduce them, ironically increasing error rates.

4.2 Conclusion

After conducting a thorough review and analysis of all three spreadsheet modeling standards, we have concluded that no further additions to the BPM Standards and Conventions are currently necessary.

4.3 Feedback

We welcome feedback and the submission of further comments or suggestions for inclusion in the Standards: http://www.ssrb.org/contact

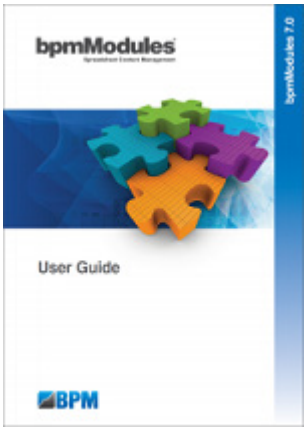
[3] bpmToolbox Lite is a free add-in that contains all of the tools required to implement the Best Practice Spreadsheet Modelling Standards quickly and efficiently. A full commercial version of bpmToolbox is also available that contains all of these tools as well as a large number of model development tools to assist with more specific tasks. The Standards and bpmToolbox Lite are free paired content that enable any individual to easily construct robust Best Practice models.

Other Best Practice Modelling publications...

Standards
Tabulated Listing

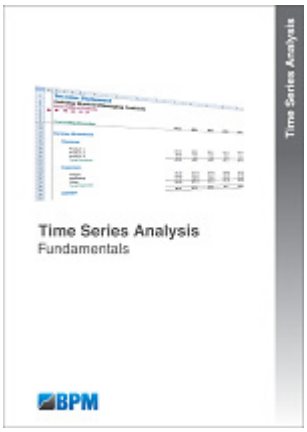
Standards
Commentary & Examples

bpmToolbox
User Guide



bpmModules
User Guide

Business Planning
Modular Development



Time Series Analysis
Fundamentals

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